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## CSIR SUPPORT TO RESEARCH New Research Schemes: 1970-71

Ninety-two new research schemes, including Retired Scientists' schemes, tenable during 1970-71 at various university departments and research institutions, have been sanctioned by CSIR (*CSIR News*, Vol. 20, p. 129). Research Committee-wise, the break-up figures are as follows: Chemical Research Committee, 45; Physical Research Committee, 36; Geological & Mineralogical Research Committee, 9; and Radio & Telecommunication Research Committee, 2. Titles of the research schemes, the names of the investigators and the university departments and institutions where the schemes are tenable are as follows:

### Chemical Research Committee

1. Reversible and irreversible processes at DME in aqueous and non-aqueous media  
Dr C. M. Gupta  
Chemistry Dept, University of Rajasthan, Jaipur
2. Metal chelates with phenanthrene-quinone derivatives  
Dr R. P. Singh  
Chemistry Dept, University of Delhi, Delhi 7
3. Studies on the preparation and spectra of cyclopentadienyl derivatives of some transition metals and related compounds  
Prof. B. D. Jain  
Chemistry Dept, University of Delhi, Delhi 7
4. Studies on the chlorination of rock phosphate and solubilization without using sulphuric acid  
Prof. V. Ramakrishna  
Chemistry Dept, IIT, New Delhi
5. Chemical investigation of some Xerophytic plants of Rajasthan  
Dr B. C. Joshi  
Chemistry Dept, University of Rajasthan, Jaipur
6. Chemical investigations of Indian medicinal plants with special reference to saponins, sapogenins, steroid alkaloids constitution and biogenesis  
Dr I. P. Varshney  
Chemistry Dept, G. S. Technological Institute, Indore

7. Transformations of terpenoids  
Dr P. Sengupta  
Chemistry Dept, University of Kalyani, Kalyani
8. Hydride transfer reactions  
Dr C. N. Pillai  
IIT, Madras
9. Investigation into the chemistry of Baeyer's carvestrene (*dl*-sylvestrene)  
Prof. James Verghese  
Christian Medical College Vellore
10. Chemical investigation of some of the flora of Jammu and Kashmir region  
Prof. A. C. Jain  
Chemistry Dept, Jammu University, Jammu
11. Evolutionary pattern of enzymes involved in ascorbic acid biosynthesis  
Dr I. B. Chatterjee  
University College of Science Calcutta University, Calcutta
12. Studies on the metabolism of amino acids and carbohydrates with special reference to intestinal function  
Prof. A. N. Radhakrishnan  
Christian Medical College Vellore
13. Effects of ultraviolet light on amino acids  
Dr Rashid Ali  
Aligarh Muslim University Aligarh
14. Nuclear magnetic resonance and thermochemical studies on the influence of protein denaturants on water structure  
Dr J. C. Ahluwalia  
Chemistry Dept, IIT, Kanpur
15. A new electrode (tubular graphite electrode) for polarographic measurements  
Dr L. R. Sharma  
Chemical Engineering and Technology Dept, Panjab University, Chandigarh
16. Studies on molecular complexes  
Dr D. C. Mukhopadhyay  
University College of Science Calcutta University, Calcutta
17. Polarography of organic compounds in non-aqueous media  
Dr S. K. Tiwari  
College of Engineering & Technology, Aligarh Muslim University, Aligarh
18. Mechanistic studies on catalysed substitution of aromatic compounds  
Dr J. Rajaram  
IIT, Madras
19. Electronic spectra of molecules  
Dr Mihir Choudhury  
Chemistry Dept, Presidency College, Calcutta
20. Structure, stability and application of complexes of Schiff's bases  
Dr Yag Dutt  
University of Delhi, Delhi 7
21. Isotope fractionation studies in coexisting minerals  
Dr T. Sharma  
IIT, Kanpur
22. Organo-metallic compounds of Group-III B metals  
Dr T. N. Srivastava  
Chemistry Dept, Lucknow University, Lucknow
23. Comparative study of the donor properties of oxygen, nitrogen and sulphur atoms in the complexes of heavier and inner-transition elements

## Physical Research Committee

Dr A. K. Srivastava  
Meerut College, Meerut

24. Mössbauer effect studies  
Dr P. S. Goel  
Chemistry Dept, IIT, Kanpur

25. Spectroscopic and quantum chemical studies on biologically important molecules,  
Dr Devendra Kumar Rai  
Banaras Hindu University  
Varanasi 5

26. Trans-esterification studies  
Dr I. M. Mathai  
Chemistry Dept, Madras Christian Medical College, Madras

27. Spectral and magnetic study of some inorganic anions and organo-metallic complexes  
Dr (Mrs) Kamla Tondon  
Chemistry Dept, Jodhpur University, Jodhpur

28. Determination and separation of the noble metals  
Dr S. C. Shome  
Presidency College, Calcutta

29. Alkoxide and polymers of silicon and carbon  
Dr R. P. Narain  
Chemistry Dept, Gorakhpur University, Gorakhpur

30. Studies on mixed ligand-metal chelates  
Dr Man Haran Nath Srivastava, Allahabad University, Allahabad

31. Redox polymerization  
Prof. G. S. Misra  
Chemistry Dept, Jabalpur University, Jabalpur

32. Metal complexes of N-hydroxy compounds  
Dr B. C. Bhattacharyya  
Chemistry Dept, Jadavpur University, Calcutta

33. Sensitized explosive reactions by oxidation and halogenation processes  
Dr B. P. Yadava  
Chemistry Dept, Lucknow University, Lucknow

34. Kinetic study of metal ion catalysed oxidation of dipolar molecules by one electron abstracting oxidants  
Dr H. S. Singh  
Chemistry Dept, Allahabad University, Allahabad

35. Hydride complexes of platinum metals  
Dr G. K. Narayana Reddy  
Chemistry Dept, Bangalore University, Bangalore

36. Studies on the electron transfer mechanisms in some bi- and polynuclear transition metal complexes  
Dr P. K. Das  
Chemistry Dept, Presidency College, Calcutta

37. Study of fast coordination reactions  
Dr P. C. Nigam  
Chemistry Dept, IIT, Kanpur

38. Theoretical study of organic excimers, dimers and dimer ions  
Dr A. K. Chandra  
Chemistry Dept, IIT, Bombay

39. Synthesis and characterization of pure acyl derivatives of glycol ricinoleates and evaluation of their plasticization characteristics for PVC resins  
Dr R. K. Bhatnagar  
Shri Ram Institute for Industrial Research, Delhi

40. Utilization of sisal waste for the recovery of hecogenin, a raw material for the preparation of steroid drugs  
Dr B. Pathak  
Applied Chemistry Dept, Calcutta University, Calcutta

41. Development of technology for the manufacture of block copolymers  
Dr R. T. Thampy  
Shri Ram Institute for Industrial Research, Delhi

42. Bulk preparation of biochemicals  
(i) Prof. B. K. Bachhawat  
Chemistry Department, Christian Medical College, Vellore; and  
(ii) Dr D. P. Burma  
College of Medical Sciences, Banaras Hindu University  
Varanasi 5

## Retired Scientists' Schemes

43. Improvement of wood by impregnation with monomers and curing by heat-catalyst  
Dr D. Narayanamurti  
C/o National Aeronautical Laboratory, Bangalore

44. Preparation of monochromatic gelatin filters  
Dr V. K. Leley  
Maharashtra Association for the Cultivation of Science, Poona

45. Some new uses of mica  
Dr Sailendra Mohan Das Gupta  
Chemistry Dept, Ramakrishna Mission Residential College, P. O. Narendrapur, 24-Parganas  
West Bengal

1. Investigations in the theory of concave grating and its mountings  
Dr M. M. Joshi  
Physics Dept, Allahabad University, Allahabad

2. Study of the motional states of polar impurities in solid state matrices  
Dr Gopal Krishna Pandey  
Physics Dept, Allahabad University, Allahabad

3. Indigenous magnetic tapes  
Dr K. K. Bhutani  
J. K. Institute of Applied Physics and Technology, Allahabad University, Allahabad

4. X-ray diffraction study of fibres  
Dr M. P. Hemkar  
Physics Dept, Allahabad University, Allahabad

5. Study of the electronic structure of solids using the Mössbauer effect  
Dr K. Rama Reddy  
Physics Dept, Aligarh Muslim University, Aligarh

6. Study of the vacuum ultraviolet spectra emitted by multiply ionized atoms of Y, Zr, Nb and No  
Dr M. S. Chaghtai  
Physics Dept, Aligarh Muslim University, Aligarh

7. (i) Flow between eccentric cylinders and spheres; and (ii) Creeping flows  
Dr N. Rudraiah  
Dept of Post-Graduate Studies in Mathematics, Visvesvaraya College of Engineering, Bangalore

8. Mathematical study of problems of wave propagation in elastic and other continuous media with special reference to finding field due to the presence of bodies of different shapes  
Prof. S. C. Das Gupta  
Mathematics Dept, Bengal Engineering College, Howrah

9. Studies of magnetic properties of plasma  
Prof. A. Bose  
Indian Association for the Cultivation of Science, Calcutta

10. Study of thermohydrodynamic oscillations—their origin, characteristics and manifestations during crystal growth  
Dr P. G. Deo  
Applied Sciences Dept, Punjab Engineering College, Chandigarh

11. Quantum mechanical computations of organic compounds  
Dr A. N. Singh  
Physics Dept, Magadh University, Bodh-Gaya

12. Investigation of the electronic spectra of polyatomic molecules in n.u.v. region  
Dr S. M. Pandey  
Physics Dept, University of Gorakhpur, Gorakhpur

13. Investigation of the emission and absorption spectra of polyatomic molecules  
Dr C. P. Dwivedi  
Physics Dept, Gorakhpur University, Gorakhpur

14. Dielectric properties of polymers  
Dr C. R. K. Murty  
Physics Dept, Andhra Post Graduate Centre, Guntur

15. Study of transition metal and rare earth complexes  
Dr Swami Prasad Tandon  
Physics Dept, Jodhpur University Jodhpur

16. Light scattering and Raman effect and temperature variation of directional properties of crystals  
Dr N. Rajeswara Rao  
Physics Dept, Osmania University, Hyderabad

17. Study of the hyperfine fields using perturbed angular correlation techniques  
Dr G. N. Rao  
Physics Dept, IIT, Kanpur

18. (i) Study of the state of electrons inside metals and alloys with the help of optical data obtained by polarimetric method; and (ii) Critical study of the different theories of the properties of metals and alloys with special reference to their optical properties  
Dr K. N. Prasad  
Physics Dept, Science College, Patna University, Patna

19. Ultrasonic study of critical states in binary liquid systems  
Dr M. G. Seshagiri Rao  
Physics Dept, Regional Engineering College, Srinagar

20. Design and construction of an electrostatic drive for measurement of internal friction and Young's modulus of quenched and irradiated metals and alloys  
Dr D. L. Bhattacharyya  
Physics Dept, Faculty of Science, Banaras Hindu University, Varanasi

21. Spectroscopic studies of chemiluminescent reactions  
Dr Chandra Mani Pathak  
Spectroscopy Dept, Faculty of Science, Banaras Hindu University, Varanasi

22. High resolution studies of diatomic molecules  
Dr Onkar Nath Singh  
Electrical Engineering Dept, Institute of Technology, Banaras Hindu University, Varanasi

23. Applications of radioactive fluid-flow problems in porous media  
Dr G. K. Gupta  
Physics Dept, DBS (Post Graduate) College, Dehra Dun

24. Solid state applications of perturbed angular correlations  
Prof. S. K. Saha  
Physics & Astrophysics Dept University of Delhi, Delhi 7

25. Optical, electrical and semiconducting properties of polymers  
Dr Nitish K. Sanyal  
Physics Dept, University of Gorakhpur, Gorakhpur

26. Electro-optical studies of photoconducting phosphorus  
Dr Devendra Sharma  
Physics Dept, Gorakhpur University, Gorakhpur

27. Studies of shear wave propagation in highly viscous liquids  
Prof. B. Ramachandra Rao  
Physics Dept, Andhra University, Waltair

28. Development of semiconductor detectors for nuclear radiation  
Dr P. K. Aditya  
Physics Dept, Regional Engineering College, Kurukshetra

29. Parameters and characteristics of junction gate field effect transistors  
Prof. B. Ramachandra Rao  
Physics Dept, Andhra University Waltair

30. Study of bulk viscosity in liquids using ultrasonic methods under high pressure  
Dr P. Sitaramaswamy  
Applied Physics Dept, Andhra University, Waltair

31. Observation and analysis of visual meteoric data  
Dr M. Srirama Rao  
Physics Dept, Andhra University, Waltair

32. Studies on nuclear structure (below 2 MeV region)  
Dr D. L. Sastry  
Nuclear Physics Dept, Andhra University, Waltair

33. Age determination and uranium concentration by fission track studies  
Dr K. K. Nagpaul  
Physics Dept, Kurukshetra University, Kurukshetra

34. Transport of neutrons in crystals  
Dr A. K. Ghatak  
Physics Dept, IIT, New Delhi

35. Relaxation processes in dielectric  
Dr Pradip Kumar  
Allahabad University, Allahabad

36. Construction of a high temperature single crystal Weissenberg camera and X-ray analysis of crystals up to 1200 °C  
Dr M. A. Viswamitra  
Indian Institute of Science Bangalore

#### **Geological and Mineralogical Research Committee**

- Petrology, genesis and economic considerations of the titanium bearing vanadiferous magnetites and associated rocks of Barbar and Nagarjoni Hills near Bela, Gaya Dist. (Bihar)  
Dr A. K. Bhattacharya  
Banaras Hindu University Varanasi
- Geochemical and economic studies of refractory minerals around Pipra, Dist. Sidhi, M. P.  
Dr S. N. Verma  
Banaras Hindu University Varanasi
- Mineralogical study of the Mafic phases of Amjori Hill in Simlipal Complex of Mayurbhanj, Orissa  
Dr K. C. Sabu  
IIT, Bombay
- Structural evolution of the Dharwars of the Chitaldrug Schist Belt and its relation to the stratigraphic sequence and copper  
Prof. D. Mukhopadhyay  
Presidency College, Calcutta
- Structure and tectonics of Biana-Lalsot Region in Rajasthan with special reference to Precambrian Stratigraphy  
Prof. P. K. Gangopadhyay  
Presidency College, Calcutta
- Phase equilibria studies in the sulphide minerals  
Dr S. Sitaramayya  
Osmania University, Hyderabad
- Study of the diversity of igneous rocks of Mundwara Dist. Sirohi, Rajasthan  
Dr G. S. Roonwal  
Delhi University, Delhi 7

8. (i) Paleomagnetic study of Newar Dolerites of Singhbhum area (believed to be of Precambrian age); (ii) Paleomagnetic study of iron ore formations of Singhbhum (of Precambrian age); and (iii) Paleomagnetic study of Gondwana formation of Triassic age from Aurunga and Huttar coalfields

Dr R. K. Verma

Indian School of Mines, Dhanbad

9. Erosion and tectonics of the Narmada Valley

Dr V. D. Choubey

Kurukshetra University

Kurukshetra

#### Radio and Telecommunication Research Committee

1. Study of large scale ionospheric drifts between Ahmedabad and Udaipur employing spaced receiver technique

Dr R. K. Rai

University of Udaipur, Udaipur

2. Investigations on the technology of thin film devices and their applications in microelectronics

Dr S. K. Srivastava

Radio and Electronics Research Laboratory, Banaras Hindu University, Varanasi.

Colombo. This work has provided the architects, for the first time, a comprehensive basis for designing fenestrations for daylighting in the Far Eastern region. A prototype solar water heater was designed and fabricated. The heater is capable of heating water up to 55°C in winter afternoons.

In the field of prefabrication, the production technology of large panels with battery casting, their assembly and jointing technique have been perfected and a two-roomed house comprising battery cast concrete load bearing large wall panels, facade and partitions in brick and precast cored slabs for floor/roof has been completed. A scheme has been developed for using precast reinforced concrete roofing/flooring units without structural deck concrete above them. Another structural scheme evolved by CBRI is concerned with the use of solid precast planks for the service area consisting of W.C., bath and kitchen.

To meet the growing shortage of housing and to lower building costs, a project to develop a simple and flexible system for housing, which will contribute to speed and economy in construction, has been taken up. The construction of 60 system-built dwelling units has been taken up by the New Delhi Municipal Committee in collaboration with CBRI. In this scheme, 23 cm load bearing brick walls and precast cored roofing units have been adopted for a 4-storey construction.

Based on planning studies and constructional techniques developed by CBRI, a comprehensive report for the construction of about 400 system-built dwelling units at Ahmedabad has been submitted to the Gujarat Housing Board.

Nine processes developed by CBRI were licensed to industry during the year. The processes relate to solar water heater, brick making machine, tamping machine, cement paints, expansion joint filler from cashewnut shell liquid and coconut pith, improved burning of limestone, cement coconut pith concrete for thermal insulation, asbestos sprayer, and calcination of dolomite.

## PROGRESS REPORTS

### CBRI Annual Report : 1969

The impact which the under-reamed piles have made on the foundation practices and the extension of this technique to mast foundations for railway electrification and transmission line towers, leading to about 70% savings in constructional costs, are among the highlights of the annual report of the Central Building Research Institute (CBRI), Roorkee for 1969 published recently. Based on tests carried out on a multi-underreamed pile in sandy soil the institute designed piles and cast them for a 15-storey, 45 m high electronics and telecommunication tower at the University of Roorkee.

In the field of building materials the institute made concerted efforts for utilizing inferior soils for brick-making in view of the non-availability of agricultural lands for this purpose. Processes were worked out for making bricks of adequate compressive strength from *Kallar* (saline) soils of Panjab, and sticky and plastic soils of Korba (Madhya Pradesh). Good quality Mangalore type roofing tiles have been produced from alluvial soils of Uttar Pradesh and Himachal Pradesh, and their large scale manufacture has been taken up in cooperation with a local kiln owner. A new process for using indigenous amphibole variety of asbestos in asbestos-cement products of satisfactory strength was developed. The process consists in fibrizing and blending simultaneously the amphibole and chrysotile

(imported) varieties in the machine developed by CBRI. Transverse strength tests of asbestos-cement sheets produced show that 50-75% imported asbestos can be replaced by the indigenous variety in the manufacture of asbestos-cement sheets. Light-weight bricks, and door and window frames have been produced using magnesium oxychloride and sawdust compositions. The frames possess adequate strength, machinability, fire resistance, paintability and nail holding properties. Calcination trials were carried out in the gypsum calcination kettle of 1 ton capacity, designed and built during the previous year, and operational conditions were standardized for obtaining maximum fuel efficiency. It has been found that a temperature of 130-170° is most suitable. The average coal consumption is 70 kg/tonne of gypsum and the thermal efficiency is 35%. With a view to finding new uses for granulated slag, masonry cement containing high proportion of slag was developed, and mortar prepared with the cement gave very satisfactory results.

Based on the institute's work on clear skies prevalent in India, the Indian Standards Institution has revised its code of practice on daylighting of buildings. This is a big step in which India has given a lead to other countries in the tropics. An Unesco project on illumination studies for the Far East was completed and a report submitted to the Asian Regional Institute for School Building Research,

## CPHERI Annual Report: 1969

Of the various fields of public health engineering, such as water treatment and distribution, sewage treatment and disposal, industrial wastes treatment, air pollution and industrial hygiene, rural sanitation and solids waste disposal and instrumentation, which receive the attention of the Central Public Health Engineering Research Institute (CPHERI), Nagpur, progress in the field of water treatment during 1969 has been noteworthy. The annual report of the institute for the year, which has been brought out recently, records among others the development of a new medium, Defluoron-2, for defluoridation of drinking waters. Pilot plant trials of the medium at Gangapur (Rajasthan) and Nalgonda (A.P.) have shown encouraging results. Prepared entirely from indigenous materials, Defluoron-2 is superior to other media developed earlier by the institute (such as PHERI carbon) in regard to attritional properties, and costs about Rs 1500/m<sup>3</sup>. The cost of defluoridation of water is between Re 1 and Rs 2 per 1000 gal of water. A home defluoridation unit has also been designed and fabricated by the institute.

Work was continued on the development of a series of coagulation aids from indigenous raw materials for the treatment of waters and a small unit was set up for producing them for field trials. The products (Rs 1-1.50/kg) reduce the dosage of alum required in water treatment and thus effect considerable savings in sulphur consumption. For on-the-spot disinfection of drinking waters the institute developed tablets, known as double action tablets, which also remove suspended matter; a 1-g tablet is sufficient to treat about 2 gal of water containing up to 500 ppm turbidity. At the instance of the Armed Forces Medical Services the institute developed indigenous filter aids, FA-1 and FA-2, which can replace imported diatomaceous earth.

In the field of sewage treatment, the evaluation of low-cost methods for waste water treatment was continued. Attempts were made to utilize sewage effluents for cultivating essential oil bearing plants, one of the safe uses to which they could be put.

*Cymbopogon* spp (citronella) and *Mentha piperita* were found to thrive well under sewage irrigation; the yield of the oil also was found to improve. Characterization of industrial wastes and development of methods for their treatment constituted, as in the previous years, an important programme of work. Work on the characterization of wastes from the Orient Paper Mills, Amlai was completed. An anaerobic lagoon pilot plant has been in operation for the treatment of pulp mill effluents. The data collected during the 9-month period showed a BOD reduction of 75% at a detention period of 10 days. A lagoon of 1 million gal capacity is being developed. Laboratory studies on the digestion of black liquor from the Security Paper Mills, Hoshangabad showed that the waste is amenable to anaerobic treatment at pH 9.0 and at a dilution of 1:2 (waste: water/sewage).

A short-term study of air pollution in three major cities of India, viz. Bombay, Calcutta and Delhi, made during 1968-69, indicated the need for a long-term study on a national scale. Consequently eight industrial cities have been chosen where the studies would be continued on a regular schedule to find out the seasonal variations and the trend of atmospheric pollution. Air pollution problems referred to the institute by industries were also undertaken on consultation basis and remedial measures suggested. The work involved: (i) definition of the nature of the problems; (ii) detection of the source of pollution; and (iii) assessment of the existing levels of pollution. Among air pollution investigations in industrial premises, undertaken during the year, mention may be made of those referred by the Fertilizer Corp. of India, Trombay; Coromandal Fertilizers Ltd, Visakhapatnam; and Gwalior Rayon Silk Mfg (Wvg) Co. Ltd, Movvur (Kerala). The institute has been designated as WHO regional reference centre on air pollution.

The research projects of the institute lay also in the areas of solids waste disposal and rural sanitation. An interesting piece of work done during the year related to the conversion of blow-room cotton dust into compost.

Among the other activities of the institute, which completed 10 years in 1969, mention may be made of (1) holding of the international symposium on 'Low-cost waste treatments'; and (2) publication of a manual entitled 'Design, construction and operation of waste stabilization ponds in India', and a guide entitled 'How to conduct air pollution surveys'.

Six patents were filed during the year. Four were concerned with coagulation aids CA-4, CA-5, CA-7 and CA-11; and one each was concerned with Defluoron-2 and wind direction recorder. As many as 23 investigation reports were brought out by the institute during the period under report.

### Studies on Carbohydrate Metabolism

Studies on carbohydrate metabolism with special reference to the influence of proteins on the diabetic state have been made by Shri H. N. Doddanaranna of the Central Food Technological Research Institute (CFTRI), Mysore, under the guidance of Dr M. Srinivasan, Emeritus Scientist, CFTRI.

Oral glucose tolerance tests (GTT) on 54 adult-onset diabetics confirmed the favourable influence of protein (30 g calcium caseinate) ingested along with carbohydrate on GTT, which had been observed earlier on a limited number of subjects in this laboratory. Similar results were obtained in GT tests with 15 normal subjects.

Also, intravenous glucose (i.v.) tolerance tests on 14 normal subjects showed 3- to 5-fold increase in glucose utilization rates in 7 of them. All had ingested 30 g of calcium caseinate 30 min prior to i.v. glucose load.

Protein (caseinate), fed to the normal or diabetic subject, did not potentiate nor prolong the action of insulin administered (subcutaneous or i.v.).

Trypsin and papain hydrolysates of casein were no more efficacious than the whole protein. An amino acid mixture, conforming to the composition of casein, was found to be less effective than the parent protein as seen in GTT. The effects

of proteins on glucose tolerance and fasting blood sugar (FBS) levels in diabetic and normal subjects could not, therefore, be attributed to the component amino acids, but to the whole protein *per se*, as protein effects on GTT were seen within half-an-hour after protein ingestion. Leucine, which at fairly high doses is known to precipitate hypoglycemia in idiopathic (familial) hypoglycemic cases, failed to register any such effect in normal subjects at 4 g (present in 30 g casein) doses. Leucine had a variable influence on GTT and FBS levels in normal subjects, but no effect in the few diabetic subjects tested.

The effects of protein ingestion on FBS levels in the diabetic and normal subjects were variable, but, on the average, there was a tendency towards a fall in the majority of cases.

Serum insulin-like activity (ILA) was determined in diabetic and normal subjects after protein ingestion by measuring glucose uptake by the epididymal fat pad of the rat. The results indicated a marked rise in ILA after protein or glucose ingestion. In the case of the diabetics, the rise in ILA after protein ingestion was higher than after glucose ingestion. The combination of glucose and protein elicited responses higher than with glucose or protein alone, though the effects of the two were not additive.

Stimulation of insulin secretion appears to be the principal mode of action by which proteins beneficially affect blood sugar and glucose tolerance, as indicated by the serum ILA increments following protein ingestion. On this basis the greater response of the early cases of diabetics to the protein could be explained.

The sera of the diabetics, as also of the normals, contained factor(s) which inhibited the basal uptake of glucose by the fat pad and also affected the resultant insulin stimulation. The factor(s) appears different from the known antagonists in serum which inhibit insulin action or glucose uptake by the fat pad, since the inhibition, as recorded in the present set of cases, is not eliminated by dilution.

In clinical trials with 50 adult-onset diabetics, it was found that in

the majority of cases supplementation of protein to the diet served to reduce their insulin or anti-diabetic drug requirement, and helped in controlling their hyperglycemia, in addition to nutritional benefits conferred by extra-dietary, wholesome protein (caseinate), suggestive of a rationale for a diabetic regimen.

Since the effect of ingested protein on glucose tolerance, wherever positive, was always within half-an-hour after protein intake, it was evident that this effect was not mediated through alterations in liver glycogen. This was further borne out in experiments with rats, in which the glycogen deposited some hours after a glucose load was unaffected by a concurrent feed of calcium caseinate while protein fed some hours after glucose, depleted glycogen, as observed by earlier workers.

The research worker, Shri Doddanarayappa, was awarded the Ph.D. degree of the Mysore University (1970) for his thesis based on the work.

### **Shrinkage in Collagen Fibres, Skins and Leathers**

Raw hides and skins possess a certain amount of wet heat resistance. Shrinkage temperature is a measure of this resistance and is the temperature at which raw skins or leathers begin to shrink when heated in a liquid. A fair amount of information is available with respect to shrinkage temperature and this parameter is used for process control in leather making. But the information available on dimensional changes associated with shrinkage is scanty, though the knowledge of dimensional change is of importance for making oil seals, washers and such other leathers. Hence a systematic study of the shrinkage behaviour of skins and leathers and collagen fibres, the basic fibrous protein of skin, was carried out by Shri K. J. Kedlaya of the Central Leather Research Institute (CLRI), Madras under the guidance of Dr Y. Nayudamma (principal investigator) and Dr N. Ramanathan (research guide).

The study showed that diffusion causes swelling (e.g. pickled samples in water), or a change in the existing swelling if the specimen is already

swollen (e.g. limed samples in water) or it can bring about a change in the content of incorporated chemical capable of loosening the structure. Tanning with various tanning agents causes stabilization. Drying influences the shrinkage behaviour when the specimen tested does not contain the chemical that can retain three-dimensional network structure of skin and/or when the specimen is not given stabilization treatment.

The effects of diffusion on hydro-thermal shrinkage can be eliminated by using respective process liquor as heating medium instead of water. But this may not be practicable. An inert fluid like liquid paraffin was found to be the best alternative heating medium for shrinkage measurements.

Because of different living habitat, skins of shark may have different structure and hence their hydro-thermal stability may differ. Since skins of marine animals are also used for making leather, shrinkage properties of such skins were also studied. It was reported that shark fin collagen possessed good hydro-thermal stability. The present study has indicated that the stabilization is similar to that brought about by vulcanization.

Age is an important factor influencing the shrinkage characteristics of skin and collagen. The age-dependent changes in the shrinkage behaviour of skin and collagen were found to be not due to accumulation of metal elements in traces but probably due to the accumulation of metabolic aldehyde intermediates.

It is reported in literature that hydroxyproline, one of the amino acid bonds constituting collagen, is liberated when collagen fibres are shrunk. The present studies do not however point to this conclusion.

The study of shrinkage characteristics of skin and collagen further confirmed that the degree of structural stability imparted to hides and skins varies from one tanning process to another.

The research worker, Shri Kedlaya, was awarded the Ph.D. degree of the Madras university (1970) for his thesis on the subject.

## Biochemical and Chemotaxonomical Studies in *Anethum graveolens* and *Anethum sowa*

Among the umbelliiferous crops cultivated as spice or condiments in India, dill (*Sowa*) occupies a prominent place because of its wide utility and export potential of its fruits. While the green aromatic herb is an item of every-day use in the Indian culinary and its fruits are used as condiment and for treatment of stomach and liver disorders, the oil of the herb is extensively marketed all over Europe and America for flavouring food and for use in confectionary preparations. The medicinal properties of the oil of dill fruits are recognized in Indian and British pharmacopoeias.

European dill is *Anethum graveolens* Linn., and its Indian counterpart is regarded as a geographical type or a variety. Some early Indian taxonomists, however, distinguished the Indian plant as a separate species under *Anethum sowa* because of differences in their foliage and fruits, which has not been held valid. The chemical composition of their ethereal oils has later brought more pronounced differences to light. The oil of Indian dill fruits has consistently low carvone content, the principal flavour constituent, and in addition contains a pharmaceutically undesirable constituent, dillapiole, in appreciably high percentage. Hence the Indian plant stock is considered inferior and as such the products (fruit and oil) of Indian origin fetch a much lower market price.

Shri Rajendra Gupta of the Central Indian Medicinal Plants Organization (CIMPO), Lucknow, has made a comparative study of the morphology of the two representative plant types, the histology of their organs, pollen grains, vittae, karyotype of their chromosomes, and physiological and growth characters. The physico-chemical properties of their essential oils have also been studied at different growth periods at the CIMPO Farm, Haldwani. Quantitative and chromatographic evaluation of the chemical constituents of the two oils have also been made.

On the basis of the studies the Indian plant has been given the

nomenclature *Anethum graveolens* Linn. sub-sp. *sowa* (Roxb. ex Flem) Gupta.

A significant finding is that while apiole and its isomer dillapiole together form a considerable part of the Indian type oil of dill fruits (14% and above), dillapiole also occurs (up to 3%) in the oil of fruits of the European stock when grown in India. The study has further revealed that the dillapiole begins to be formed at early fruiting stage and is highest at full maturity. Data on various edaphic and meteorological conditions prevailing during the growing period of the crop in India and Hungary (the other principal grower of the crop) were collected and analysed. It has been suggested by the research worker that a consistently higher solar intensity during fruiting under Indian conditions might be responsible for accelerating the synthesis of more oxygenated components in the European type dill plants leading to the formation of dillapiole in detectable quantity.

A study of herbarium sheets of the dill plants maintained in India and abroad and the world distribution of the plant was also made. It has been shown that the plant is a native, originally of sub-temperate region of Bengal, Assam and Burma where it is still reported to be found wild. Its introduction in West Asia and Eastern Europe seems to have taken place at very early times either through direct introduction into cultivation or as an adulterant to other identical spice crops. The flattened shape of the fruits (in comparison to the convex appearance in the Indian type), the lighter (body) weight, the development of comissural ridges into wings, all appear to be acquired as adaptation for more efficient dispersal of their fruits by wind for ensuring better chances of survival of its progeny seeds. The much loosely held mericarps in the European dill fruits by carpophores is also a trend in the same direction.

In the course of the study, 17 commercial cultivars from all over the dill growing countries of the world were collected and grown experimentally at the CIMPO Farm. A promising high yielding cultivar, isolated by single plant selection, gives statistically significant yield of fruit crop and the oil distilled from it

conforms to the pharmacopoeial standards. The cultigen is being multiplied.

Shri Gupta was awarded the Ph.D. degree by the Agra University (1970) for the thesis based on the work.

## Patents Accepted

Indian Pat. 113406

**A new thermistor composition exhibiting high positive temperature coefficient of resistivity (posistor)**

B.G. Brahmecha & K.P. Sinha  
NCL, Poona

In contrast to the well-known negative temperature coefficient of resistivity exhibited by thermistors, posistors are characterized by their positive temperature coefficient of resistivity beyond the transition temperature. Further, the value of the temperature coefficient of resistivity of posistors is much higher than that of thermistors (40-60%°C). This feature has opened up numerous avenues of practical applications in electronic engineering, such as thermal regulator, overheat protector, and current and voltage stabilizer. Posistors have already surpassed the field of application of thermistors as thermal sensing elements.

The present invention relates to the development of a new posistor which shows a higher value of temperature coefficient of resistivity than reported so far. The posistor consists of  $\text{BaTiO}_3$  doped with either erbium or terbium and the solid solutions of  $\text{BaTiO}_3$  with some other suitable isomeric compounds in the perovskite family such as  $\text{SrTiO}_3$ ,  $\text{CaTiO}_3$ . The temperature coefficient of resistivity of the thermistor varies from 80 to 30%°C depending upon the type of the compound. Also, the desired value of transition temperature could be obtained by choosing a suitable composition as indicated above.

Indian Pat. 118569

**Production of microcrystalline cellulose**

B.P. Chaliha, S.B. Lodh &  
M.S. Iyengar  
RRL, Jorhat

Microcrystalline cellulose finds wide application in the pharmaceutical industry for the production of tablets,

stable dispersions and the like due to its characteristic gelling property. It is also used in food and cosmetic industries.

Microcrystalline cellulose is produced in foreign countries from high grade wood and cotton pulp. The present invention relates to the development of a process for the production of microcrystalline cellulose from bamboo and reed pulps. The process consists in hydrolysing the pulp, and washing it thoroughly with water followed by stirring and spray drying. The cost of production per ton of microcrystalline cellulose on a 240-kg/day capacity plant is estimated at Rs 3800 as against the import price of Rs 10 000 per ton.

Indian Pat. 117025

**Coagulant aid (CA 3)**

K. R. Bulusu, V. P. Thergaonkar & D. N. Kulkarni  
CPHERI, Nagpur

Coagulant aids, in a broad sense, include all those substances which speed up the process of coagulation. In water treatment, coagulation is generally understood as a reaction between alum and the ions responsible for the natural alkalinity of the water, resulting in an insoluble precipitate. The coagulant aid speeds up the reaction, makes the precipitated floc weighty and assists in creating a bridge between the colloids or small flocs. The present invention relates to the development of a series of coagulant aids from indigenous natural products. One of the coagulant aids, designated CA3, is capable of producing excellent flocculation when added to clay suspension in conjunction with alum in quantities that are only a small fraction of those required for flocculation with alum. Investigations on a pilot plant and at the Kanhan Waterworks have shown that a saving of 40-54% in alum consumption could be effected.

PATENTS FILED

127468: Improvements in or relating to the design of ammonia dissociator and a catalyst therefor, H. V. K. Udupa, P. V. V. Rao & V. Gandhiramasubramanian—CECRI, Karai-kudi.

127576: A process for the manufacture of calcium sennoside extract from senna plant material, K. Ganapathi, N. C. Nigam & M. M. Chopra—RRL, Jammu.

127749: A process for the production of microcrystalline waxes and distillates from crude oil tank sludges, A. K. Biswas, P. V. Krishna & M. S. Iyengar—RRL, Jorhat.

127750: A process for the production of pyridoxine hydrochloride, C. G. Joshi & S. Dev—NCL, Poona.

127751: A process for the regeneration of used lubricating oils, A. K. Biswas, P. V. Krishna & M. S. Iyengar—RRL, Jorhat.

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111928: Flotation cell for deinking waste paper, M. S. Iyengar, S. B. Lodh, B. Chaliha & P. N. Phukan—RRL, Jorhat.

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112153: Improvements in or relating to high strength deformed bars for concrete reinforcement, Z. George & G.S. Ramaswamy—SERC, Roorkee.

112217: An injected beam crossed-field tube, R. P. Wadhwa & G. S. Sidhu—CEERI, Pilani.

113776: Improvements in or relating to suspension at the driven wheel of ground vehicles, M. S. R. Keshav, A. M. Subramanian & T. S. Gill—CMERI, Durgapur.

114324: A process for the preparation of 1,2,3-triphenylpropenes of biological interest, R. N. Iyer, R. Gopalachari, V. P. Kamboj & A. B. Kar—CDRI, Lucknow.

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Applications are invited for the post of Director in the scale, Rs 2000—100—2500, for the Regional Research Laboratory (RRL) at Bhubaneswar.

The main objects of the laboratory are to carry out research and development in the exploitation of natural resources of the region and to help the development of industries in the region. The laboratory has presently undertaken projects of utilization of agricultural and forest products and byproducts, minerals and ore beneficiation, design and development of industrial machinery such as material handling equipment.

Candidates should have high academic qualifications in any field of science/engineering/technology and should have to their credit outstanding experience and leadership in formulating and guiding research and development programmes.

**Job requirements:** To head RRL, Bhubaneswar and to plan, guide and conduct research and development programmes and projects of the laboratory.

There is no standard form of application. Those who wish to be considered are invited to send a statement of their qualifications and attainments with the following information to Secretary, CSIR, Rafi Marg, New Delhi 1 on or before 31 October 1970: (1) name, (2) full postal address, (3) date and place of birth, (4) examinations passed and degrees and qualifications obtained with class or division year-wise, subjects taken and names of institutions and the universities, (5) countries visited, duration and purpose, (6) details of post-graduate work, with copies of list of publications with reprints, (7) details of how employed so far, and (8) names and addresses of three referees.